

Work Order ID 72502

Wednesday, July 27, 2011 9:12:32 AM



U/P

Page 1

Item ID: D350-748-101

Accept



Setup Start



Revision ID:

Item Name: Crosstube Installation, High Fwd

Stop



Start Date: 7/27/2011 Start Qty: 1.00

Required Date: 8/16/2011 Req'd Qty: 1.00



Cust Item ID:

Customer:

Reference:

Approvals: Process Plan: ✓ Date: 11-07-27 Tooling: _____ Date: _____

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D350-748-141	F	OK 11.08.24							
100	DOCUMENT CONTROL	0.00							
	DC	Memo							
Document Control	Photocopy bluefile & type labels per PPPD350-748-101	0.00	CHG002	8 wlos/25					df for CL 11-8-23
110	BENDING MACHINE - CROSSTUBES	0.00							
	CNC Bend I	Memo							
CNC Delta 100 Bender	Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT _____	0.00							Pho →
120	QC15- Crosstube Dimensional Check	0.00							
	QC	Memo							
Quality Control		0.00		8 wlos/03					11-8-3

B72502 D350-748-101

W/O: 72502		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D38-745-101 PAR #: N/A Fault Category: Landing Gear NCR: Yes ☒ No ☐ DQA: OK Date: 11.08.29
 Resolution: acceptable Disposition: use AS IS QA: N/C Closed: ☒ Date: 11/08/29

NCR: 72502		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
		tube is acceptable Per David's signature Email						
11/08/29	#1 to	tube is bent out of tol. R.C. Process	OK 11/08/29 DS/OK	tube is acceptable Per Email From David S. to E. Downy See Attach.	N/A	OK 11/08/29 DS/OK	OK 11/08/29 DS/OK	OK 11/08/29 DS/OK

NOTE: Date & initial all entries

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Cust Item ID:

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Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
125		0.00							
HandFXtube		0.00				①			
Hand Finishing Crosstubes	Memo ***Stress relief*** Heat treat crosstube as per QSI010 4.3 Temp: <u>375</u> Start time: <u>4:30</u> Finish time: <u>8:30</u>		SAD	11-08-03					
127	QC6- Inspect dimensions to drawing	0.00							
QC		0.00				②			
Quality Control	Memo								

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Cust Item ID:

Required Date: 8/16/2011 Req'd Qty: 1.00

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

130

0.00



Crosstubes

Crosstubes

Memo

0.00

1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B & C Drill Jigs,
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-141

4-Remove all marks from tube within limits of D350-748-141

5- Apply a light coat of LPS3 on the interior of tube

Batch: 71109956

140-

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)

Quality Control

Handwritten notes and signatures:

- Large signature: *[Signature]*
- Date: *11-8-8*
- Signature: *TW* Date: *11-08-09*
- Signature: *SAD* Date: *11-08-10*
- Signature: *[Signature]*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150 Outsource3 Outsource process - Cad plate	Outsource process-Cadplate per QSI017 4.1.9.1 Memo Issue P/O: 14653 Stress relief at 375° for 5 hours Magnetic Particle Inspect per ASTM E1444 Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375° for 8 hours, Chromate Treat Possibe Supplier: Southwest United Industries Ensure Certificate of Conformity is attached	0.00 0.00							CL 11/08/10 ①
160 Packaging Packaging	Receive & Inspect for Damage & Mat'l Certs Memo Ensure certificate of conformity is attached	0.00 0.00							CL 11/08/22 ①
170 QC Quality Control	QC5- Inspect part completeness to step on W/O Memo	0.00 0.00							① P10

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	
11.08.22	171	GEAR LOADED TO 3500 ^{lb} FDR 1 MINUTE PER ATTACHED DS. EMAIL	TS	11/08/22	1	CP 11.08.22 DS1042		
11.08.22	172	NDT Tube acc'd C2 11/08/23 PO 14725 acuperv NDT 11-08-23	C2 M		1	CP 11.08.22 DS1042	JS 11/08/23	

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Cust Item ID:




Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180  SprayPaint Spray Painting	SprayPaint Memo 1-Prime inside crosstube as per QSI 005 4.2 2-Prime Outside of Tube as per Dart QSI 005 4.2	0.00 0.00				<u>11</u>	<u>11</u>	<u>08</u>	<u>24</u> (1)
190  QC Quality Control	QC14- Inspect Spray Paint Memo Then, Wrap in plastic bag to protect from scratches	0.00 0.00				<u>25</u>	<u>11</u>	<u>08</u>	<u>25</u>
200  Crosstubes Crosstubes	Crosstubes Memo 1-Install Ground wire Insert, then insert screw and washer 2-Install Abrasion strips as per Dwg D350-748-141 & QSI 035. 3-Install supports Using Dt8876 as per Dwg D350-748-141, Torque to 60-80 IN-LBS	0.00 0.00				<u>11</u>	<u>11</u>	<u>08</u>	<u>25</u> (1)

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Cust Item ID:

Customer:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Run Start

Stop

Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

210

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

8/1/25

70

220

Pick Kit

0.00



Packaging

Memo

0.00

Packaging

11/8/25

230

QC4- 100% Inspect kits for completeness

0.00



QC

Memo

0.00

Quality Control

8/1/25

70

W/O:		WORK ORDER CHANGES					
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Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Cust Item ID:

Required Date: 8/16/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start



QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240	Packaging	0.00							
	Packaging								
	Memo	0.00							
	Identify and pack for shipping as per PPP D350-748-101								
	Location: _____								
	PPP Rev: _____								
250	QC21- Final Inspection - Work Order Release	0.00							
	QC								
	Memo	0.00							
	Quality Control								

11/8/25

11/8/25

MF 11-08-25

W/O:		WORK ORDER CHANGES					
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Picklist Print

Wednesday, July 27, 2011 9:12:39 AM

Page 1

Work Order ID: 72502

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd





Start Date: 7/27/2011

Required Date: 8/16/2011

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 06-07-05 JLM
 IPP Rev:B Update qty of MS21042L5 06-09-12 KJ
 IPP Rev:C Rev B 07-11-15 DD
 IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD
 IPP Rev:E 08-06-24 revD as per dwg DD verified by:EC IPP Rev:F
 10.08.04 added QSI010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D350-748-141TRN 		Manufactured	No			110	Each	0.0000	1	1	1	11-8-3	
Crosstube Turning Detail													
ALS4-1032-225 		Purchased	No			200	Each	931.0000	1	1	1	11-08-25	
Insert													
				<u>Location</u>	<u>Loc Qty</u>		<u>Loc Code</u>						
				ST282	931								
				110768	62								
				117717	9								
				118386	860								
AN960JD10 	NAS1149D0363J	Purchased	No			200	Each	0.0000	1	1	1	11-08-25	
Washer 		Manufactured	No			200	f	290.3845	1.181	1.243158	1	11-08-25	
Abraison Strip													

B# 111581

B# 118077

Location

Loc Qty

Loc Code

ST403

73.7149

68076

73.7149

ST409

216.6696

63735

0.6696

71164

216

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Work Order ID: 72502

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 7/27/2011

Required Date: 8/16/2011

Start Qty: 1.00

Required Qty: 1.00

D3502-1

Manufactured

No

200

Each

25.0000

2

2



Support

Location

Loc Qty

Loc Code

ST063

25

61206

12

61843

3

64004

10

MS21920-20

Purchased

No

200

Each

80.0000

2

2



Clamp (per MIL-DTL-8783C)

Location

Loc Qty

Loc Code

LG050

80

116799

10

117279

28

118236

42

MS27039-1-10

Purchased

No

200

Each

155.0000

1

1



Screw

Location

Loc Qty

Loc Code

ST290

150

117441

150

ST291

5

115935

5

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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Work Order ID: 72502

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 7/27/2011

Required Date: 8/16/2011

Start Qty: 1.00

Required Qty: 1.00

AN4-41A

Purchased

No

220

Each

299.0000

8

8

Bolt

Location

Loc Qty

Loc Code

ST360

299

115108

74

115705

50

116191

50

117619

50

117795

25

118451

50

AN4-6A

Purchased

No

220

Each

918.0000

16

16

Bolt

Location

Loc Qty

Loc Code

ST356

718

116924

218

117872

200

118422

300

ST358

200

117514

200

AN5-32A

Purchased

No

220

Each

228.0000

4

4

Bolt

Location

Loc Qty

Loc Code

ST340

228

117161

2

117514

50

117688

16

117872

60

118191

50

118422

50

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Required Date: 8/16/2011

Start Qty: 1.00

Required Qty: 1.00

AN960JD416 NAS1149D0463J Purchased No

220

Each

0.0000

32

32



Washer

AN960JD516 NAS1149D0563J Purchased No

220

Each

0.0000

8

8



Washer

D3500-1 Manufactured No

220

Each

32.0000

4

4



Saddle

Location

Loc Qty

Loc Code

ST424

9

66127

9

ST424/25

20

62207

20

ST425

3

61838

3

D3501-1 Manufactured No

220

Each

321.0000

16

16



Bushing

Location

Loc Qty

Loc Code

ST063

221

61984

19

68939

102

70682

100

ST066

100

67757

100

Wednesday, July 27, 2011 9:12:39 AM

Shop Packet Print

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Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
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Start Date: 7/27/2011

Required Date: 8/16/2011

Start Qty: 1.00

Required Qty: 1.00

MS21042L4

Purchased

No

220

Each

5,459.000

24

24



Nut



2

Location

Loc Qty

Loc Code

ST300

5459

117441

1308

117601

651

117885

1500

118451

2000

21

3

MS21042L5

Purchased

No

220

Each

1,300.000

4

4



Nut



11/8/11

Location

Loc Qty

Loc Code

ST300

1300

116105

5

116548

111

117441

498

117591

100

117611

90

118179

496

4

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

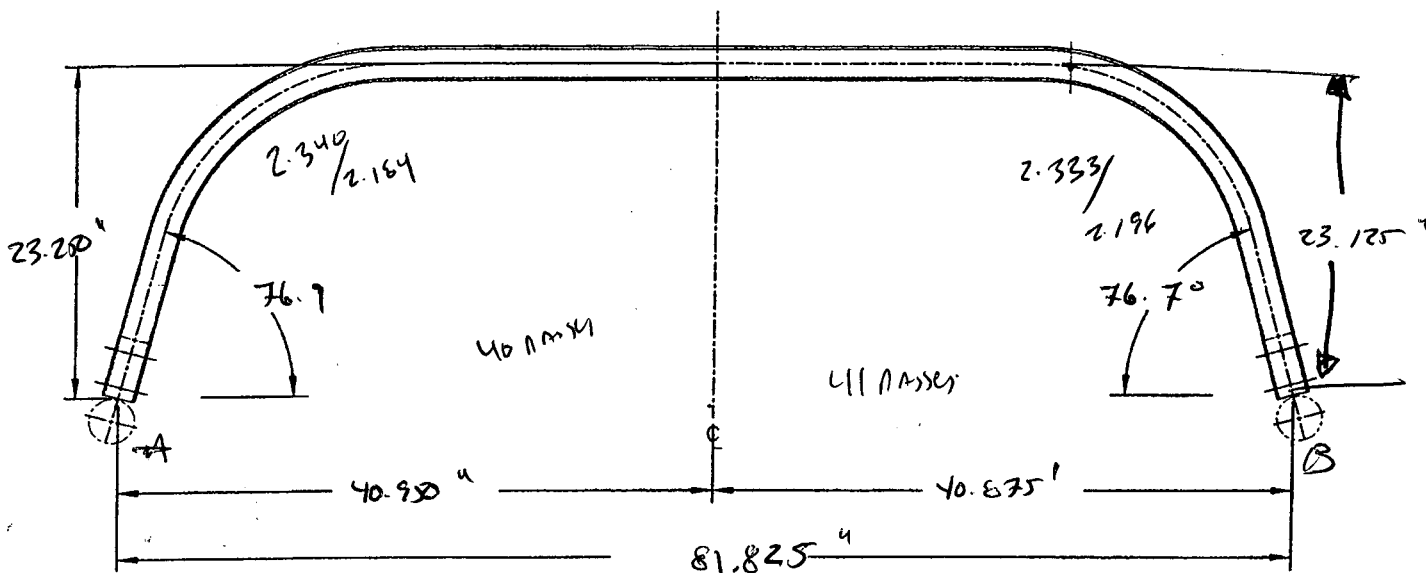
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	B72502
Description: Crosstube High Fwd (AS350/355)		Part Number:	B72502
Inspection Dwg: D350-748-141		Rev: E	Page 1 of 1

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments	
twist	20.213
S.D. A =	6.1% crushing @ 40 passes
S.D. B =	5.4% crushing @ 41 passes

QC15 Inspection	S
Date	11/08/03

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

11/08/23

W/O:		WORK ORDER CHANGES					
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Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115
FINISHED LENGTH = 110.270±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

UNDER REVIEW

RELEASED
2011-01-18

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES: UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN		DART AEROSPACE LTD	
DRAWN		HAWKESBURY, ONTARIO, CANADA	
CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 1 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD	

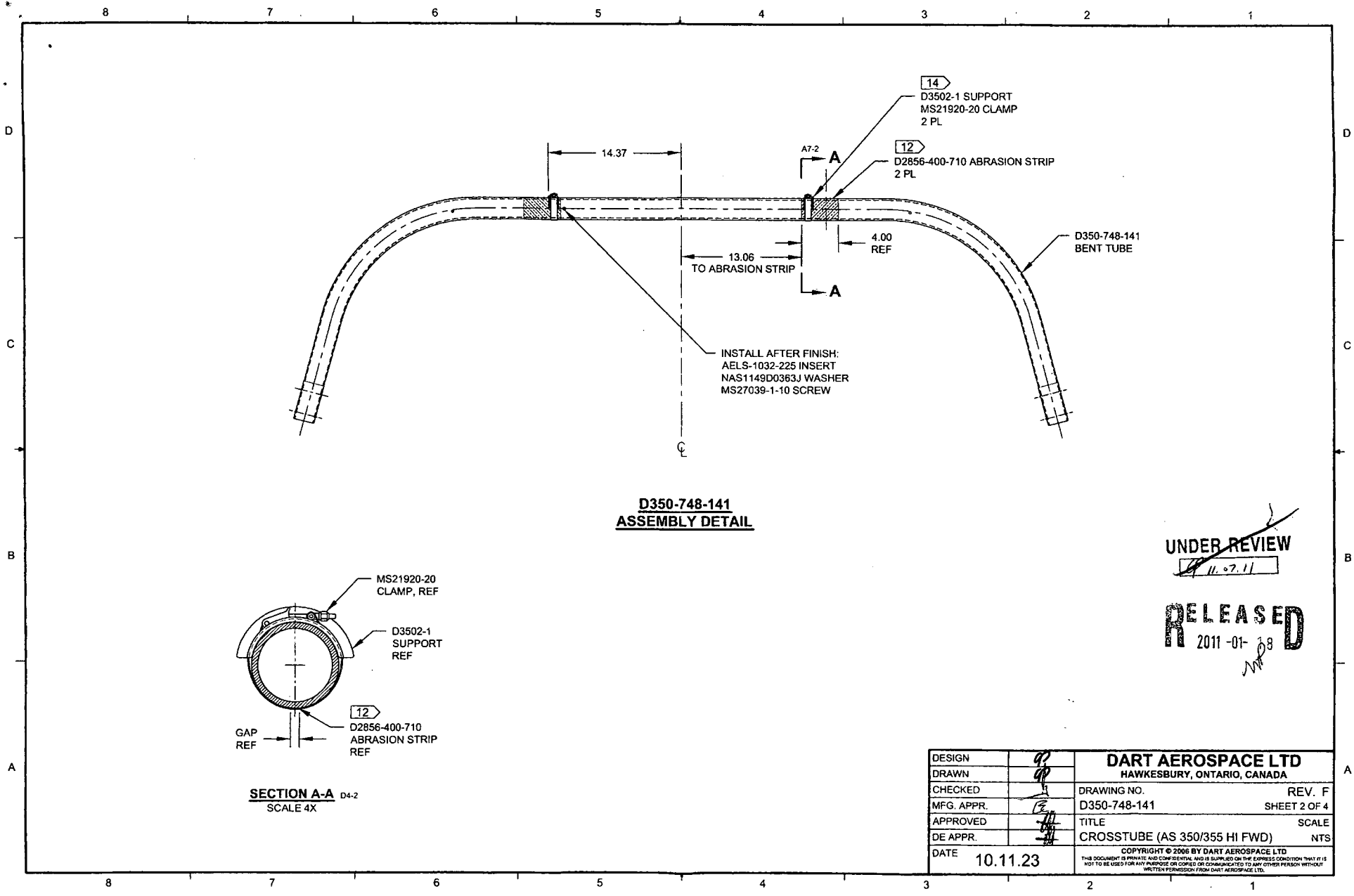
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



**D350-748-141
ASSEMBLY DETAIL**

UNDER REVIEW
11.07.11

RELEASED
2011-01-38

DESIGN	92	DART AEROSPACE LTD	
DRAWN	92	HAWKESBURY, ONTARIO, CANADA	
CHECKED	1	DRAWING NO.	REV. F
MFG. APPR.	1	D350-748-141	SHEET 2 OF 4
APPROVED	1	TITLE	SCALE
DE APPR.	1	CROSSTUBE (AS 350/355 HI FWD)	NTS
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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

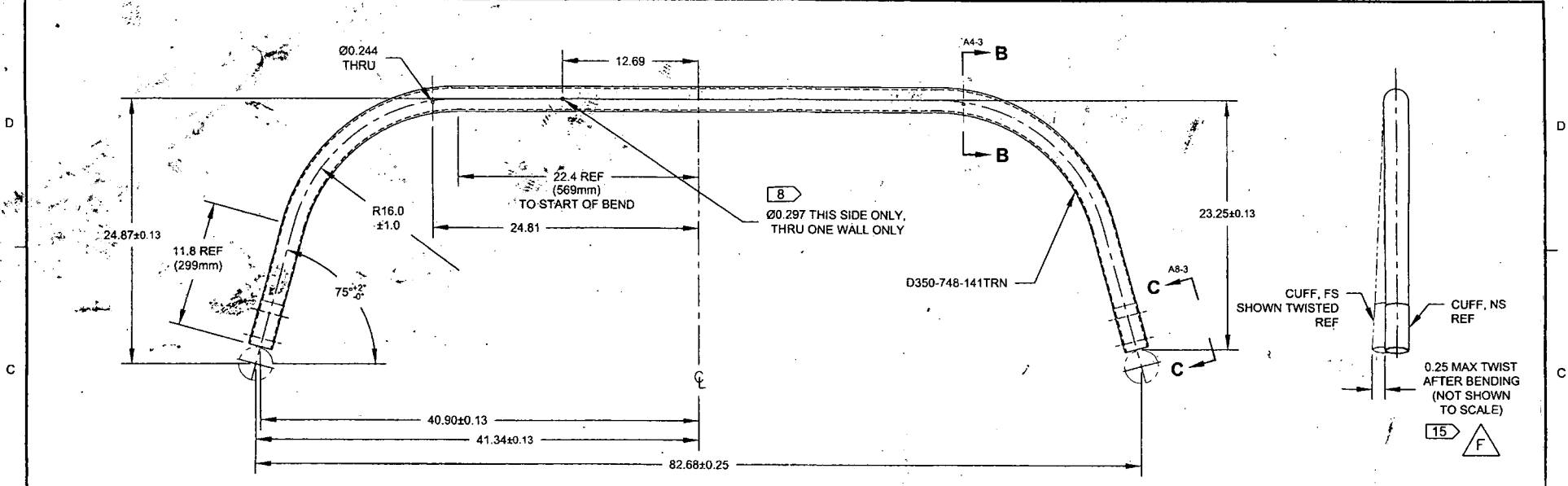
Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

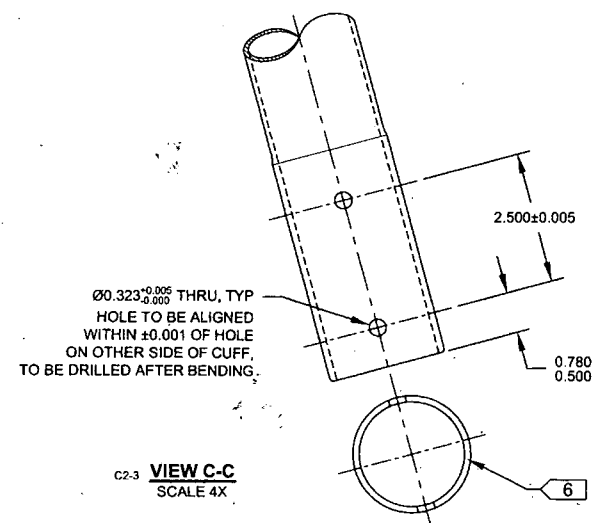
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

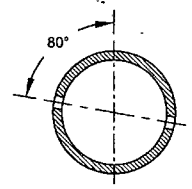
8 7 6 5 4 3 2 1



D350-748-141
BENDING AND DRILLING DETAIL 10



VIEW C-C
SCALE 4X



SECTION B-B D3-3
SCALE 4X

UNDER REVIEW
27.12

RELEASED
2011-01-18

DESIGN	DP	DART AEROSPACE LTD	
DRAWN	DP	HAWKESBURY, ONTARIO, CANADA	
CHECKED	DP	DRAWING NO.	REV. F
MFG. APPR.	DP	D350-748-141	SHEET 3 OF 4
APPROVED	DP	TITLE	SCALE
DE APPR.	DP	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD</small>	

8 7 6 5 4 3 2 1

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

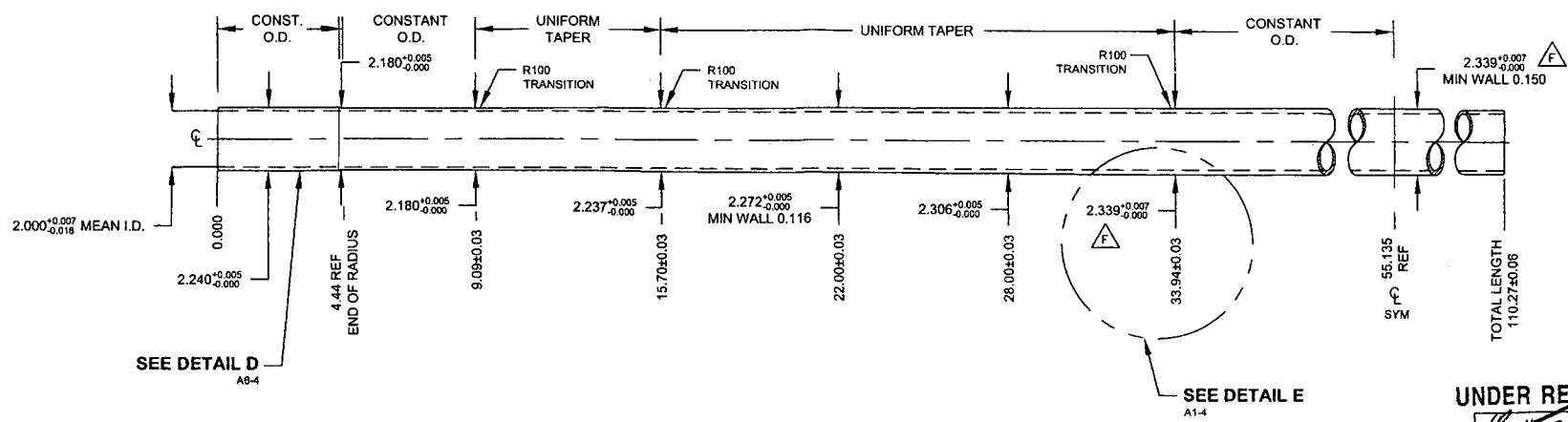
Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

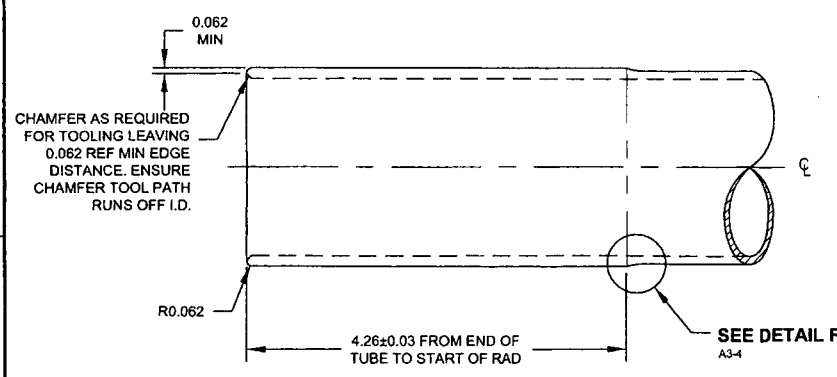
NOTE: Date & initial all entries

8 7 6 5 4 3 2 1

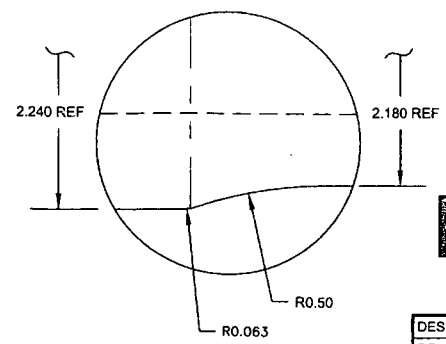


**D350-748-141TRN
TURNING DETAIL**

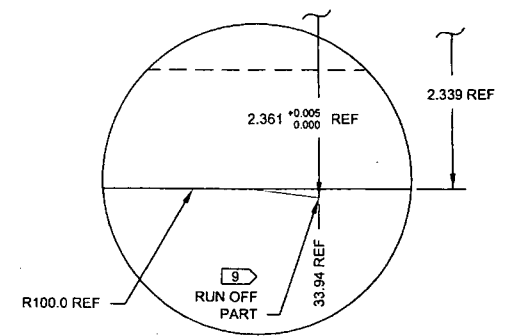
UNDER REVIEW
10.07.12



**DETAIL D:
CROSSTUBE CUFF** C7-4
SCALE 3X



**DETAIL F:
CUFF TRANSITION** A5-4
NOT TO SCALE



**DETAIL E:
TAPER RUN-OFF** C3-4
NOT TO SCALE

RELEASED
2011-01-13

DESIGN	97	DART AEROSPACE LTD	
DRAWN	97	HAWKESBURY, ONTARIO, CANADA	
CHECKED	13	DRAWING NO.	REV. F
MFG. APPR.	13	D350-748-141	SHEET 4 OF 4
APPROVED	13	TITLE	SCALE
DE APPR.	13	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	10.11.23	COPYRIGHT © 2006 BY DART AEROSPACE LTD	
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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Eric Downing

From: David Shepherd <dshepherd@dartaero.com>
Sent: August 3, 2011 4:36 PM
To: 'Eric Downing'
Cc: 'Bill Beckett'; 'Mike Petsche'; 'L Lacelle'; 'Susanne Sheldon (Susanne Sheldon)'; 'Chris Provencal'
Subject: RE: 350 cross tubes out of tol.

Eric,

Not sure what to tell you ... I think this is a scrap tube ... It is already 0.33" narrower than nominal ... If we trim it to make it level, it will be close to 0.50" narrower than nominal ... Compounded with the fact that is twisted by almost 0.50" ... With everything that is wrong with this tube, I don't think Chris would accept it either ... It's going to be tough for a customer to get everything to line up and he will have to pre-stress the gear quite a bit to get it together. Please scrap the tube, or set it aside for development testing.

Thanks,
David

From: Eric Downing [mailto:edowning@dartaero.com]
Sent: August-03-11 2:10 PM
To: 'David Shepherd'
Cc: 'Bill Beckett'; 'Mike Petsche'; 'L Lacelle'; 'Susanne Sheldon (Susanne Sheldon)'
Subject: RE: 350 cross tubes out of tol.

David

Sorry about that David I didn't see it was missing a batch #. The # is 72502. I re attached the dim sheet with the correct Batch # on it.

For tube B68520 could we cut it to the correct height and span and from talking to Dan Paquette he has told me that Chris has approved that high of a twist before. I'll look tomorrow to make sure we have in the past. But I know that we are up against the wall(as Bill would say) to try to get as many tubes as possible sent out for Cad plating so if it could be saved it would be much appreciated. But if it can't it can't then it should be scrapped.

Downing

From: David Shepherd [mailto:dshepherd@dartaero.com]
Sent: August 3, 2011 3:58 PM
To: 'Eric Downing'
Cc: 'Bill Beckett'; Mike Petsche; 'L Lacelle'; 'Susanne Sheldon (Susanne Sheldon)'
Subject: FW: 350 cross tubes out of tol.

Eric,

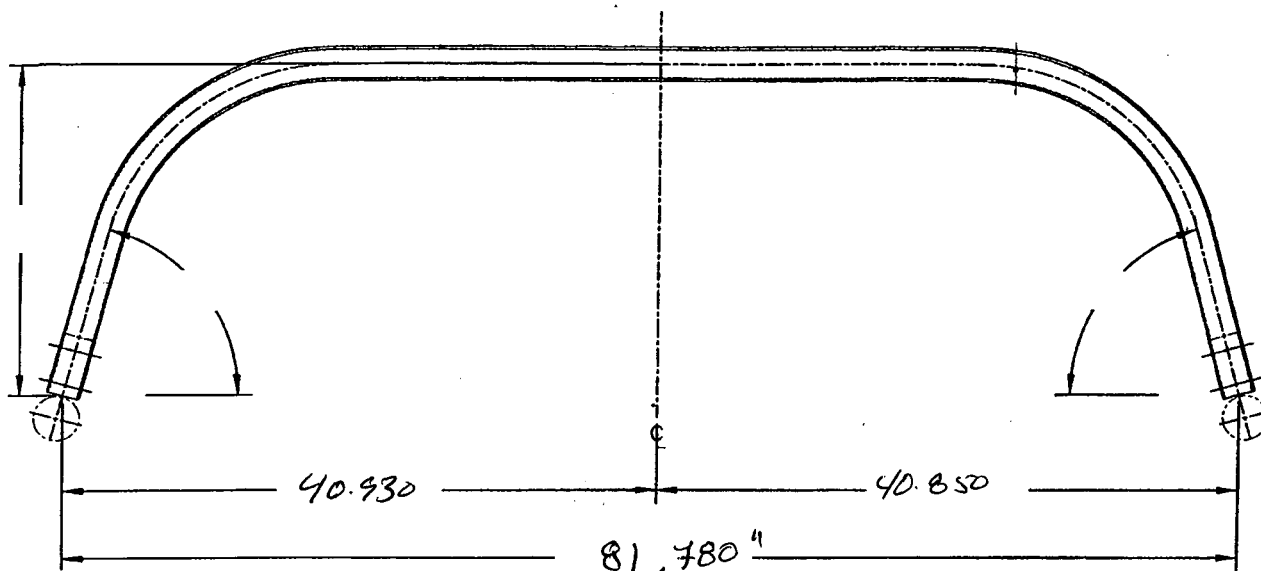
B68519 is acceptable
B????? is acceptable (please add a B/N to inspection sheet)

B68520 is badly twisted and has height/spread difference from side-to-side of 0.25" so I think it should be scrapped.

David

DART AEROSPACE LTD		Work Order:	
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments
twist = 0.107

QC15 Inspection	<i>S. M. B. / S</i>
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

[Signature] 100823

Packing Slip



Cadorath Coating

2150 Logan Avenue, Winnipeg, Manitoba R2R-0J2

Phone: (204) 633-9420 Fax: (204) 633-8033

INVOICE NUMBER:

56257

Net 2% Interest Per Month charged on Overdue Accounts.
Any claims for shortages, overcharges, or damaged goods must
be made within seven (7) days from receipt of goods.

Sold To:

Dart Aerospace Ltd.
1270 Aberdeen St.

Hawksbury, ON K6A 1K7

ShipTo:

Customer Order #: 14653

Date Received: Aug-15-2011

Terms:

NET 30 DAYS

G.S.T. #:

10071 6547 RT0001

Ship Via:

Ship Date:

Aug-19-2011

Item # Qty P/N & Description

1	1 EA	SKID	S/N B68519	✓
		P/N d350-748-101	W/O 106856	
2	1 EA	SKID	S/N B72502	✓
		P/N d350-748-101	W/O 106857	
3	1 EA	SKID	S/N B61773	—
		P/N D350-748-201	W/O 106858	
4	1 EA	SKID	S/N B61774	—
		P/N D350-748-201	W/O 106859	

CL 11/08/22

Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



ACUREN

LIQUID PENETRANT TEST REPORT

P- 05628

CLIENT

ATTENTION

ADDRESS

PROJECT

ITEM(S) EXAMINED

DATE

ACUREN JOB NO.

PO/VO NO.

WORK LOCATION

ACCEPTANCE STD.

PAGE

OF

TIME

AM

PM

DART AEROSPACE
LYNDA/CHAUSTALE/IAN/MATTAug/23/2011
18811-02167

HAWKE BURY, ON

AS ADDRESS

ASTM 1417/42E-03B

REV./DATE 2005

PT WET FLUORESCENT ON 4 CROSSTUBES

- SEE BELOW

JOB DESCRIPTION

PROCEDURE NO. LT-002 REV./DATE 2008

TECHNIQUE NO. LT-002

REV./DATE 2008

ART NO.

COPE

STEEL/CADMIUM PLATING MATERIAL ALUMINUM THICKNESS N/A

PERFORMED A WET FLUORESCENT L.P. INSPECTION ON 100% OF THE EXTERNAL SURFACE ON ITEMS MENTIONED BELOW

TEST DETAILS

METHOD

☒ FLUORESCENT☐ VISIBLE☒ WATER WASH☐ SOLVENT REMOVABLE☐ POST EMULSIFIED

AMLY BRAND

MACNAFLUX

ENETRANT

ZL-67

MINIMUM DWELL TIME

10

MIN.

ENETRANT REMOVER

H2O

MINIMUM DRY TIME

>10

MIN.

EVELOPER

SKD-52

MINIMUM DWELL TIME

10

MIN.

EVELOPER TYPE

☒ NON AQUEOUS☐ AQUEOUS☐ DRY

OTHER

LIGHT METER S/N

CAL DUE DATE Aug 2012

TEST SURFACE

SURFACE CONDITION

☐ AS GROUND☐ AS WELDED☐ MACHINED☐ SHOT BLASTED☒ CLEAN BARE METAL

SURFACE TEMPERATURE

☐ < -4°C/ 20°F☐ -4°C/ 20°F TO 10°C/50°F☒ 10°C/50°F TO 52°C/125°F☐ > 52°C/125°F

RESULTS-

☐ METRIC ☐ IMPERIAL

ITEM	DESCRIPTION	W.O. ID	W.O. ID
1	CROSSTUBE	W.O. ID 61773	
2	"	W.O. ID 61774	
3	"	W.O. ID 68519	
4	"	W.O. ID 72500	

ITEM ID	W.O. ID	W.O. ID	W.O. ID
ITEM ID	350-748-201	AFT	
ITEM ID	350-748-201	AFT	
ITEM ID	350-748-101	FWD	
ITEM ID	350-748-101	FWD	

NO RELEVANT INDICATION WAS DETECTED
AS PER APPLICABLE STANDARDS

NOTE: MTL: STEEL + CADMIUM PLATING

Scope of Services

The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care

When performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE

TECHNICIAN (SIGNATURE):

NAME (PRINT):

Ian Titley

PRINT

[Signature]

SIGNATURE

[Signature]

1ST TECHNICIAN

CGSB LEVEL

SNT LEVEL 2

CGSB REG. NO

2049

CGSB LEVEL

SNT LEVEL

CGSB REG. NO

DTR # E44717

REPORT

REVIEWED BY:

NAME

INITIALS

WHITE - CLIENT COPY

CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

GOLD - OFFICE COPY

PT Sept 2005